

Operational Testers Use Net-Centric Tools to Test Net-Centric Systems

Dewain C. Smith and MAJ Garth Winterle

Joint Interoperability Test Command, Fort Huachuca, Arizona

The U.S. Department of Defense (DoD) is attempting to field warfighter capabilities faster, within a tighter budget, and with less impact on the operational users. Concurrently, the DoD is also moving to a net-centric environment enabling information and service collaboration across the global information grid, requiring new and innovative ways to conduct operational tests (OT). Joint Interoperability Test Command (JITC) testers are utilizing some of these new collaboration capabilities provided by the Defense Information Systems Agency to reduce costs, increase flexibility, reduce warfighter support requirements, and improve quality during OTs for net-centric systems.

Net-centric systems and services typically consist of strategically located applications and/or authoritative data sources, which provide capabilities to users via the unclassified and classified DoD networks. These systems may or may not include client-side applications, but many require nothing more than access permissions and a traditional web browser to use. Users access the capabilities from their duty locations or from wherever they have connectivity. One example of such a system is the Global Combat Support Systems-Combatant Command/Joint Task Force (GCSS-CC/JTF), which provides logistics situational awareness, decision support, and visualization tools to combatant commands and Joint Task Force commanders.

A net-centric system OT requires genuine operational users to exercise the system under test in a manner consistent with its intended use to support a variety of user missions. This is normally achieved by users accessing the system and executing a series of operationally realistic scenarios while data collectors observe and record the activities of the users. This requires extensive data collector travel to operational user locations and a very structured and rigid schedule for warfighter participation. The flexibility to accommodate unanticipated users at new locations or to make last-minute schedule changes is significantly hindered by having to physically colocate data collectors at each user location, mainly because of travel arrangements,

visit requests, and resource allocations and reservations. Time and resources are also wasted when users are not available as scheduled, and data collection opportunities are lost when unanticipated users became available at the last minute.

Net-Centric Enterprise Services offers collaboration technologies through Button One (E-Collab Center) and Button Two, Defense Connect Online (DCO) tools. Either tool provides the ability to conduct collaboration events such as meetings or document reviews and offers voice over-internet protocol (VOIP) services, video (webcam), and the ability to share documents and a computer screen over the global information grid. Both tools enable varying degrees of control by the meeting organizers and are customizable to maximize collaborative efforts. The ability to record these meetings and the VOIP and screen-sharing capabilities is the keystone attribute that enabled JITC to utilize these tools for OT.

JITC incorporated DCO as part of their test strategy in conducting the GCSS-CC/JTF v7.0 OT. JITC orchestrated activities, collected data, and observed operational users remotely using DCO-provided capabilities over the classified network. The testers were located at the JITC Headquarters in Arizona while the various users participated from their desktops at the following locations:

- Defense Information Systems Agency Sky 7, Virginia;
- Joint Forces Command, Virginia;
- Central Command, Florida;
- Pacific Command, Hawaii;
- Special Operations Command, Florida;
- Transportation Command, Illinois; and
- The Pentagon, Virginia.

The major shift in test conduct enabled users to participate from their actual classified workstation, which minimized the impact on the users and increased the scope of operational environment available for testing.

Another benefit allowed stakeholders such as the Director, Operational Test & Evaluation, and the

Report Documentation Page			Form Approved OMB No. 0704-0188					
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>								
1. REPORT DATE JUN 2009	2. REPORT TYPE	3. DATES COVERED 00-00-2009 to 00-00-2009						
4. TITLE AND SUBTITLE Operational Testers Use Net-Centric Tools to Test Net-Centric Systems			5a. CONTRACT NUMBER					
			5b. GRANT NUMBER					
			5c. PROGRAM ELEMENT NUMBER					
6. AUTHOR(S)			5d. PROJECT NUMBER					
			5e. TASK NUMBER					
			5f. WORK UNIT NUMBER					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Joint Interoperability Test Command,P.O. Box 12798,Fort Huachuca,AZ,85670-2798			8. PERFORMING ORGANIZATION REPORT NUMBER					
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)					
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)					
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited								
13. SUPPLEMENTARY NOTES								
14. ABSTRACT								
15. SUBJECT TERMS								
16. SECURITY CLASSIFICATION OF: <table border="1"> <tr> <td>a. REPORT unclassified</td> <td>b. ABSTRACT unclassified</td> <td>c. THIS PAGE unclassified</td> </tr> </table>			a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 4	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified						

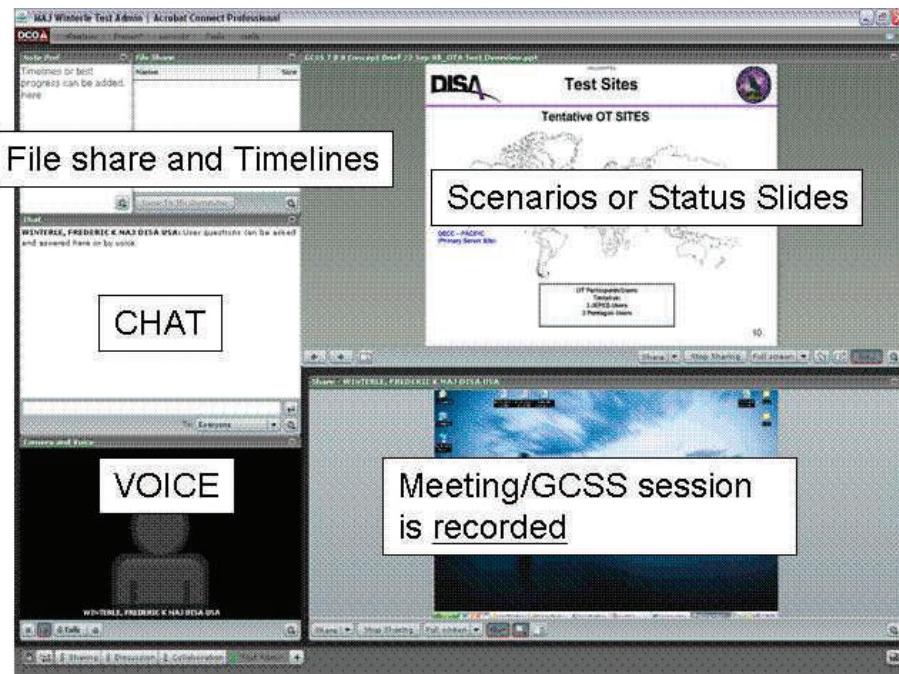


Figure 1. Defense Connect Online Test Administrator Screen. The test administrator opens individual meetings for each participant/user. The user shares his/her screen while using the Global Combat Support Systems–Combat Command/Joint Task Force. Using the record function, we eliminate the need for screen capture instrumentation.

Program Management Office representatives to observe the testing via DCO from their classified desktop at their respective locations. In one case, a conference room was set up to show the DCO session on a wall screen to facilitate group discussion and participation.

Testers organized and created the DCO sessions for each user to enable easy and consistent identification using the DCO web interface. Users were then able to share their screens when given the “presenter” role by the meeting hosts. Observers were limited to monitoring and chat functions to help prevent them from unintentionally interrupting the test process. Testers scheduled sessions with users as they were available, then distributed the session schedules and the DCO universal resource locator to all stakeholders for each event. The same user sessions were used for the duration of the test to consolidate all user recordings under the same universal resource locator for later reference. The testers posted downloadable operational scenarios, surveys, test incident report forms, and other test documents through the DCO file share pod. This made all test documentation instantly available to all users when needed and ensured a common tool set among users and testers.

Users shared their desktops while using GCSS-CC/JTF to perform test scenarios, which enabled everyone monitoring the session to observe as the users performed various activities with the GCSS-CC/JTF

system. *Figure 1* is an example of the test administrator’s screen. Using the session record function of DCO, testers eliminated the need for external screen capture tools or instrumentation.

Figure 2 is an example of the data collectors’ screens while monitoring and capturing the actions of multiple users. The data collector can monitor one or more users at a time. The data collector starts a separate session/test event as users become available. While monitoring, the data collector can follow along as the user steps through the scenarios.

The Test Administrator can

- monitor or report scenario completion by a user,
- field questions by users,
- run a test log,
- gather timeliness data from users in real time, and
- monitor test incident problem reports (TIPRs) and log calls to help desk.

In a separate DCO session, the Test Administrator can

- conduct daily hotwashes and
- run a data authentication group.

Testers controlled the test events using the VOIP and text chat functions. Testers used these functions to provide the user with instructions and to answer questions. The tester used the recording feature to

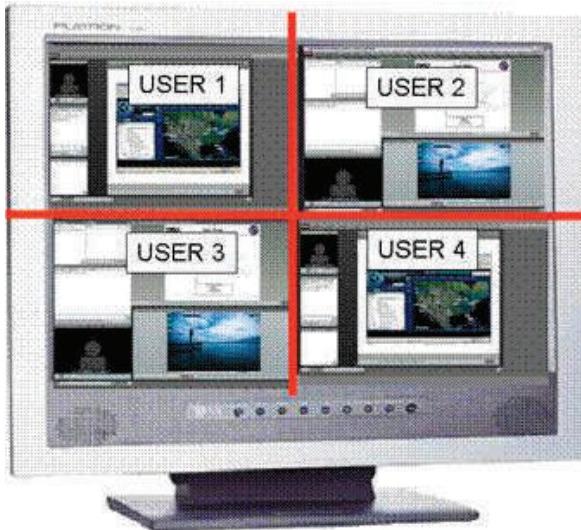


Figure 2. Test administrator screen monitoring multiple users.

capture video and VOIP data for each test event, allowing later replay of results and the capturing of error messages, user errors, or any significant event for further analysis or troubleshooting by the test team during data reduction or by the developer in identifying potential problems.

There were obvious benefits using the DCO collaboration tool in the execution of the GCSS-CC/JTF test, with cost reduction benefits being the most measurable. By executing the test remotely, JITC saved approximately \$60,000 in labor and travel costs of the \$140,000 estimated for test execution. Employing centralized data collection increased test flexibility for accommodating unanticipated users/locations and last-minute schedule changes by eliminating the need to physically colocate data collectors with each user. The ability to reschedule enabled unanticipated users to be easily accommodated into the test event or enabled planned users to reschedule as needed because of test schedule changes or user availability. The ease and speed of rescheduling and adaptability to last-minute changes resulted in the conservation of resources and overall timesaving, with no loss of data collection.

Test cost, time, and resources were reduced by employing multiple, simultaneous DCO sessions, which enabled one data collector to monitor multiple users/test events at the same time from his/her desktop at a centralized location. Users no longer had to spend time taking and saving screenshots to support data collection needs. The DCO session recordings captured the user actions and the system responses throughout the test, resulting in a visual record of all activities and all anomalies. The ability to review the recordings assisted with authenticating test data by

verifying user inputs at the time of recorded system errors. The Program Management Office, having access to the recording, could assist in determining the possible root causes of any system errors found and in developing the necessary fixes.

To ensure success when using collaboration tools for testing, the following preparations should be in place.

- Ensure maximum network connectivity during the test window:
 - ensure system administrator support is available outside of normal duty hours, and
 - rehearse actions on disconnection from the network.
- Ensure users have headsets and can use them on their classified network:
 - allow hands-free communication with the data collector, preventing the need to switch applications to use a chat tool.
- Minimize the number of simultaneous users with each data collector:
 - data collectors can better focus on user questions and actions, and
 - multiple or larger monitors can assist in maximizing data collection if multiple users must be monitored by a single data collector.

Utilizing the Net-Centric Enterprise Services collaboration tools in executing the GCSS-CC/JTF OT reduced cost by approximately \$60,000, increased the ability to incorporate schedule or other changes, and maximized data collection opportunities. The biggest advantage was the improvement of test data, in quality and quantity, by using the recording function and facilitating the warfighter's ability to participate.

Operational test community strategies must explore new and existing technologies, such as the Net-Centric Enterprise Services collaboration tools, to keep pace with accelerated acquisition programs that are trying to field improved capabilities to the warfighter community. □

DEWAIN C. SMITH is a joint testing officer at the Operational Testing Division, Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona. Mr. Smith has more than 13 years testing experience and is currently the operational test action officer for the Net-Centric Enterprise Services program. His experience includes 6 years at JITC directing operational tests on major acquisition information systems and more than 7 years

operational test experience while assigned to the Air Force Operational Test and Evaluation Center. He has a bachelor of science degree from of University of Phoenix, Tucson, Arizona. E-mail: dewain.smith@disa.mil

MAJ GARTH K. WINTERLE is a joint testing officer at the Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona. MAJ Winterle has 18 months testing experience and is currently the operational test action officer for the Net Enabled Command Capability (NECC)

and Global Combat Support System-Combatant Command/Joint Task Force (GCSS-CC/JTF) programs. He served a total of 14 years active duty in the U.S. Army, with 12 of those years spent in the Corps of Engineers as a mechanized combat engineer with deployments to Kosovo and Operation Iraqi Freedom. His civilian education includes a bachelor of science in mechanical engineering and a masters of arts in system acquisition and procurement. E-mail: garth.winterle@disa.mil

Call for Papers and Exhibits

End-to-End Testing in a Network Centric Environment

November 2 – 5, 2009 • Paradise Point Resort, San Diego, California



The evolution of network centric operations for joint military forces has challenged application developers, network architects, and operators as our forces come to increasingly rely on access to the information and collaboration that network centricity brings to the battlespace. The increased use and complexity of these systems presents new challenges in adequately testing and evaluating the tools, applications, and architectures supporting military networks. Among the topics planned for this intense workshop-like conference are:

- Testing in SOA Environment
- Sensor to Shooter Testing in an Networked Environment
- Testing for Network Centric Capabilities in Support of Irregular Warfare
- Information Assurance Testing in Network Centric Environment
- Testing in Support of Cyber Operations
- The Use of Modeling and Simulation in Net Centric Testing

ABSTRACT SUBMISSION

The deadline for the submission of abstracts is July 17, 2009. Details on the submission process can be found at www.itea.org along with descriptions for each topic. Please contact Terry McKearney at terry.mckearney@therangergroup.com

EXHIBITS

Your company or government organization will want to take advantage of the premium space that is available for you to display and demonstrate products and services for the test and evaluation community. To obtain an application to exhibit or to see the floor plan, visit www.itea.org

FEES

Available on the ITEA website.

SPONSORSHIP

Fours levels of sponsorship are available for your company to participate in: Platinum \$2500, Gold \$1000, Silver \$500 and Bronze \$250. For more information please visit www.itea.org

ACCOMMODATIONS

An ITEA room block has been established for those attending this conference with a special corporate rate of \$180 and government rate of \$147 at the Paradise Point Resort, San Diego, California 92109. We encourage you to make your hotel reservations early by calling 800.344.2626. Deadline for reservations is October 5, 2009. For more information on the hotel, please visit www.paradisepoint.com

GOLF TOURNAMENT

Join us for our 4th Annual Greater San Diego Chapter ITEA Golf Tournament at NAS North Island's Sea 'N Air Golf Course. Hole sponsorships are available for \$250. Contact Mr. Brian Bowden at bbowden@epsilonsystems.com or Mr. Jack Sears at jsears@epsilonsystems.com for more information. You can also visit the San Diego Chapter website at www.ITEA-SD.com for more information and to register.

TOUR

The test facilities at the Navy's Space and Naval Warfare Systems Center, Pacific. The Center is the Navy's primary command and control laboratory, involved in developing both Navy and joint network centric capabilities. The tours will give a "hands on" context to the workshop's proceedings.

PLANNING COMMITTEE

PROGRAM CHAIR

Mr. Jason Minter
619.702.1700 x 176
jminter@epsilonsystems.com

TECHNICAL PROGRAM CHAIR

Mr. Terrance J. McKearney
858.560.0967
terry.mckearney@therangergroup.com

EXHIBITS & SPONSORSHIPS

Mr. Bill Dallas
703.631.6226
wdallas@itea.org

www.itea.org